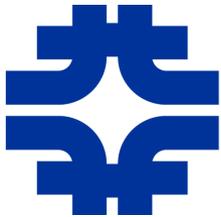


# MTA Program: Looking Back and Forward



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*MAP Winter Meeting*  
*SLAC – December 6, 2014*

- Advance ***Technology Development*** for ionization cooling
  - help design, prototype, test components
    - grid windows, modular pillbox, dielectric-loaded HPRF
- Inform machine ***Design & Simulation*** studies
  - provide performance envelope
    - vacuum RF in external magnetic field
    - HPRF in beam
- Support ***Systems Demonstrations***
  - MICE
    - Single-Cavity Module assembly, instrumentation, testing

- Contribute to general understanding of RF breakdown
- Advance ***RF in magnetic field*** R&D
  - test cavities in hand
    - modular pillbox (vacuum)
    - dielectric-loaded HPRF
  - inform ***Advanced Sources*** studies
    - provide performance envelope
      - vacuum RF in external magnetic field
      - H<sub>2</sub>-pressurized RF in beam
- Support ***MICE***
  - Single-Cavity system tests

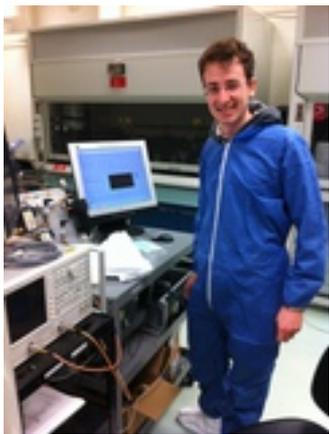
- Facility/program busier and more efficient than ever
- Dedicated crew committed to carrying out RF R&D program to completion
- MAP support for operations through mid-FY16
- Seeking general accelerator R&D support after that

- 7 cavities tested in the MTA
  - HPRF-1, short pillbox, MICE prototype, rectangular box, HPRF-2, long pillbox (all-season), MICE production
- in dozens of different configurations
  - solid endplates, single/dual buttons, thin curved Be windows, single/dual grids
- with and without magnetic field
- including 2 beam tests

- Pillbox cavity operation (basic building block for muon cooling channels)
- Thin curved Be windows (needed for pillbox cavities)
- Identified vacuum cavity issues in B-field
- Tested different materials
- Demonstration of magnetic insulation
- Demonstration of pressurized cavity (HPRF) concept
  - no conditioning, no B-field effect
- Measurement of beam-induced plasma loading in HPRF
- Demonstration of dielectric loading in HPRF
- SRF techniques applied to Cu (MICE) cavities
  - high-gradient operation with no conditioning sparks
- Demonstration of mechanical tuning system in large (MICE) cavity

- Three programs in progress/preparation
  - 201-MHz MICE cavity
  - 805-MHz Modular cavity
  - 805-MHz dielectric-loaded HPRF cavity
- See following talks for details

- MTA program has supported a steady stream of student projects
  - Peter Lane, IIT
    - Working toward Ph. D. (cavity breakdown localization with acoustic sensors)
  - Alexey Kochemirovskiy (U. Chicago)
    - Working toward Ph. D. (modular cavity program)
  - Luca Somaschini, INFN Pisa
    - M. Sc., Feb 2014 (MICE cavity tuner system)
  - Jared Gaynier (Kettering), Matt Yerkes (Purdue)
    - Undergrad (co-op), MICE cavity assy, infrastructure
  - Huy Phan (McDaniel C.), Gabriela Arriaga (NIU)
    - Undergrad, dielectric loaded HPRF, window design
  - <http://mice.iit.edu/mta/students/> (full list, >20 students over past 3 years)
- Students first author on many IPAC14, IPAC13, NAPAC13 abstracts



# Quiz: How many cavities are there in the MTA hall in this photo?

